

---

## MEASUREMENTS OF FISSION CROSS SECTION OF ACTINIDES WITH THE FIC DETECTOR AT THE n\_TOF FACILITY

Vasilis Vlachoudis<sup>1</sup>, Paolo Cennini<sup>1</sup>, Walter Furman<sup>2</sup>, Andrei Goverdovski<sup>3</sup>,  
Vladimir Ketlerov<sup>3</sup>, Vitaly Konavalov<sup>2</sup>, Carlo Rubbia<sup>4</sup>

<sup>1</sup> *CERN*

<sup>2</sup> *JINR*

<sup>3</sup> *IPPE*

<sup>4</sup> *University of Pavia*

---

Trans-Uranium elements (TRU) such as Np, Pu, Am and Cm are built up as a result of multiple neutron captures and radioactive decays in the presently operating nuclear reactors based on the U/Pu nuclear fuel cycle. Several proposals have been made to reduce the radiotoxicity of nuclear waste containing TRU. They all rely on neutron induced capture and fission of the TRU, in particular of  $^{237}\text{Np}$ ,  $^{241,243}\text{Am}$ , and  $^{244,245}\text{Cm}$ . It is clear that any kind of waste burner system, will need to be loaded with fuel containing a large fraction of TRU. The response of these systems (e.g. criticality conditions) to the presence of TRU is directly linked to the knowledge of the fission and capture cross sections of the mentioned TRU isotopes.

The weakly damped beta-vibrational states in secondary well of the potential barrier are responsible for resonance-like structures, observable if energy resolution is good enough. For the sub-barrier nuclei very pronounced vibrational resonances have been observed between 0.1 and 2 MeV where the n\_TOF neutron energy resolution allows us to study the fine structure of vibrational resonances.

With these basic motivations, the n\_TOF Collaboration has performed neutron induced fission cross section measurements of  $^{233,4,6}\text{U}$ ,  $^{237}\text{Np}$ ,  $^{241,3}\text{Am}$ , and  $^{245}\text{Cm}$  relative to  $^{235,8}\text{U}$  using the parallel plate ionization chamber (FIC) as a fission fragment detector. A total of 16 targets and 18 electrodes are mounted together, leaving gaps of 5 mm between layers. The analysis of the recently obtained results is presented.